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SERIES Q: SWITCHING AND SIGNALLING

Broadband ISDN – B-ISDN application protocols for
access signalling

**Digital Subscriber Signalling System No. 2 –
Additional traffic parameters: Signalling
capabilities to support traffic parameters for
the ATM Block Transfer (ABT) ATM transfer
capability**

ITU-T Recommendation Q.2961.4

(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION Q.2961.4

DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 2 – ADDITIONAL TRAFFIC PARAMETERS: SIGNALLING CAPABILITIES TO SUPPORT TRAFFIC PARAMETERS FOR THE ATM BLOCK TRANSFER (ABT) ATM TRANSFER CAPABILITY

Summary

Recommendation Q.2961.4 belongs to the DSS 2 family of Recommendations and specifies extensions to Recommendations Q.2931 and Q.2961.2 to specify the additional DSS 2 traffic-related parameters, formats, protocol procedures and functions needed to support the ATM Block Transfer (ABT) ATM transfer capability defined in Recommendation I.371.

Source

ITU-T Recommendation Q.2961.4 was prepared by ITU-T Study Group 11 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 12th of September 1997.

FOREWORD

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NOTE

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DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 2 – ADDITIONAL TRAFFIC PARAMETERS: SIGNALLING CAPABILITIES TO SUPPORT TRAFFIC PARAMETERS FOR THE ATM BLOCK TRANSFER (ABT) ATM TRANSFER CAPABILITY

(Geneva, 1997)

1 Scope

Recommendation Q.2961 covers the support of additional traffic parameters for the Broadband Integrated Services Digital Network (B-ISDN) at the T_B reference point or coincident S_B and T_B reference point as defined in Recommendation I.413 [1] by means of the Digital Subscriber Signalling System No. 2 (DSS 2). This Recommendation defines the DSS 2 protocol procedures, formats and functions needed to support the identified ATM traffic-related additional capabilities.

This Recommendation is part of the DSS 2 family of Recommendations; it specifies extensions to Recommendation Q.2931 [2]. It does not repeat states, information elements, messages and procedures contained therein, but only specifies extensions related to additional traffic parameter indications.

This Recommendation defines the additional traffic parameters required for the support of the ATM Block Transfer (ABT) ATM transfer capability as defined in Recommendation I.371 [3].

This Recommendation includes the use of the DSS 2 signalling procedures for the negotiation of Peak Cell Rate (PCR), Sustainable Cell Rate (SCR), Maximum Burst Size (MBS) and Resource Management (RM) peak cell rate traffic parameters during call establishment. ABT precludes use of the DSS 2 signalling procedures for the modification of traffic parameters during the active phase of the call.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- [1] ITU-T Recommendation I.413 (1993), *B-ISDN user-network interface*.
- [2] ITU-T Recommendation Q.2931 (1995), *Digital subscriber Signalling System No. 2 – User-Network Interface (UNI) layer 3 specification for basic call/connection control*.
- [3] ITU-T Recommendation I.371 (1996), *Traffic control and congestion control in B-ISDN*.
- [4] ITU-T Recommendation I.150 (1993), *B-ISDN asynchronous transfer mode functional characteristics*.
- [5] ITU-T Recommendation Q.2951.1 (1995), *Stage 3 description for number identification supplementary services using B-ISDN Digital Subscriber Signalling System No. 2 (DSS 2) – Basic call: Direct-Dialling-In (DDI)*.
- [6] ITU-T Recommendation Q.2955.1 (1997), *Stage 3 description for community of interest supplementary services using B-ISDN Digital Subscriber Signalling System No. 2 (DSS 2): Closed User Group (CUG)*.

- [7] ITU-T Recommendation Q.2957.1 (1995), *Stage 3 description for additional information transfer supplementary services using B-ISDN Digital Subscriber Signalling System No. 2 (DSS 2) – Basic call: User-to-user Signalling (UUS)*.
- [8] ITU-T Recommendation Q.2961.1 (1995), *Digital subscriber Signalling System No. 2 – Additional traffic parameters: Additional signalling capabilities to support traffic parameters for the tagging option and the sustainable cell rate parameter set*.
- [9] ITU-T Recommendation Q.2961.2 (1997), *Digital subscriber Signalling System No. 2 – Additional traffic parameters: Support of ATM transfer capability in the broadband bearer capability information element*.
- [10] ITU-T Recommendation Q.2962 (1996), *Digital subscriber Signalling System No. 2 – Connection characteristics negotiation during call/connection establishment phase*.
- [11] ITU-T Recommendation I.356 (1996), *B-ISDN ATM layer cell transfer performance*.

3 Definitions

The definitions of Annex J/Q.2931 [2] apply. In addition this Recommendation defines the following terms:

- 3.1 traffic contract:** A traffic contract specifies the negotiated traffic and QOS characteristics of an ATM layer connection at the B-ISDN UNI (see Recommendation I.371 [3]).
- 3.2 traffic control:** Traffic control at the ATM layer refers to the set of actions taken by the network to avoid congested conditions. A list of traffic control functions is given in Recommendation I.371 [3].
- 3.3 traffic parameters:** A traffic parameter is a specification of a particular traffic aspect. It may be quantitative or qualitative. Traffic parameters may for example describe peak cell rate, minimum cell rate, etc.

4 Abbreviations

The abbreviations of Annex J/Q.2931 [2] apply. In addition, this Recommendation uses the following abbreviations:

- ABT-DT ATM block transfer with Delayed Transmission
- ABT-IT ATM block transfer with Immediate Transmission
- ATC ATM Transfer Capability
- CLR Cell Loss Ratio
- MBS Maximum burst size
- PCR Peak Cell Rate
- RM Resource Management
- SCR Sustainable Cell Rate

5 Description

This Recommendation specifies the signalling of additional traffic parameters beyond the ones already specified by Recommendation Q.2931 [2]. In particular, the following additional capabilities are specified:

- support of traffic parameters for ATM block transfer with Immediate Transmission (ABT-IT) ATM transfer capability;
- support of traffic parameters for ATM block transfer with Delayed Transmission (ABT-DT) ATM transfer capability.

An ATM Block Transfer (ABT) capability is an ATM layer mechanism for providing a bearer service where the ATM layer transfer characteristics are negotiated on an ATM block basis. Within a block of ATM cells accepted by the network, the network allocates sufficient resources such that the QOS experienced by the ATM cells block is equivalent to QOS provided by a connection using the DBR ATC with the same peak cell rate.

Two ABT traffic handling capabilities are defined, namely the ATM block transfer with Delayed Transmission (ABT-DT) and the ATM block transfer with Immediate Transmission (ABT-IT).

In ABT-DT, during the connection lifetime, the cell rate of successive ATM blocks is dynamically modified between the users of the ABT-DT capability and the network using resource management cells. Positive acknowledgement from the network is required before transmitting ATM cells block at the new cell rate.

In ABT-IT, the user can transmit a block of ATM cells without waiting for a positive acknowledgement from the network. As a result, a block of ATM cells may be discarded by the network if sufficient network resources are not actually available at that moment.

At the establishment of a connection for which the use of the ABT capability is requested, the calling user shall specify:

- a maximum cell rate (i.e. the PCR) for the user generated cells with CLP 0 + 1 (including OAM cells but excluding the resource management cells);
- the Sustainable Cell Rate (SCR) and the Maximum Burst Size (MBS) traffic parameters for user generated cells with CLP 0 + 1 (including the OAM cells but excluding the RM cells); SCR may be equal to 0 and MBS may be equal to 1;
- the maximum cell rate of the ABT RM cells [using the PCR (RM) parameters];
- and, optionally, the PCR of user generated OAM cells.

The maximum cell rate PCR (CLP 0 + 1), the SCR and MBS (CLP = 0 + 1) and the PCR (RM) parameters can be negotiated between the calling user and the network and between the network and the called user at call/connection establishment time.

6 Operational requirements

6.1 Provision and withdrawal

The additional traffic indications may be included in signalling messages by the user as specified in this Recommendation provided that a prior arrangement is made with the service provider.

6.2 Requirements at the originating network side

The procedures according to clause 9 shall apply.

6.3 Requirements at the terminating network side

The procedures according to clause 9 shall apply.

7 Primitive and state definitions

7.1 Primitive definitions

See clause 2/Q.2931 [2]. No additional primitives are defined.

7.2 Call states

See clause 2/Q.2931 [2]. No additional call states are defined.

8 Coding requirements

This clause describes the additional coding requirements for messages and information elements to support the point-to-point call with the ABT transfer capability.

8.1 Messages

No additional messages are specified beyond the ones of 3.1/Q.2931. The messages defined in Recommendation Q.2931 [2] that have their contents modified to support the additional traffic parameters for the ABT transfer capabilities are described below.

8.1.1 CONNECT

This message is sent by the called user to the network and by the network to the calling user to indicate call acceptance by the called user. See Table 1 for additions to the structure of this message as shown in Table 3-4/Q.2931.

Table 1/Q.2961.4 – CONNECT message additional content

Message type: CONNECT Significance: Global Direction: Both				
Information element	Reference	Direction	Type	Length
ATM traffic descriptor	8.2.1	Both	O (Note)	4-36
NOTE – Included to specify the traffic parameter values allocated to the connection if one or more traffic parameters were negotiable in the SETUP message.				

8.1.2 SETUP

This message is sent by the calling user to the network and by the network to the called user to indicate call establishment. See Table 2 for additions to the structure of this message as shown in Table 3-8/Q.2931.

Table 2/Q.2961.4 – SETUP message additional content

Message type: SETUP Significance: Global Direction: Both				
Information element	Reference	Direction	Type	Length
ATM traffic descriptor	8.2.1	Both	M	20-36
Minimum acceptable ATM traffic descriptor	8.2.3	Both	O (Note)	4-36
NOTE – The minimum acceptable ATM traffic descriptor information element shall be included in the SETUP message when any of the PCR (CLP = 0 + 1), SCR and MBS (CLP = 0 + 1) or RM (PCR) ABT traffic parameters are negotiable.				

8.2 Information elements

Clause 4/Q.2931 [2] applies with the modifications defined in this subclause. The ATM traffic descriptor information element is defined in Recommendation Q.2961.1 [8] and is modified as specified in 8.2.1 below. The Broadband bearer capability information element is defined in Recommendation Q.2961.2 [9] and is coded as specified in 8.2.2. The minimum acceptable ATM traffic descriptor information element is defined in Recommendation Q.2962 [10] and is extended as specified in 8.2.3 below.

The information elements extended specifically when used for the ABT ATM transfer capability are described in the following subclauses.

8.2.1 ATM traffic descriptor

The ATM traffic descriptor information element is specified in Recommendation Q.2961.1 [8] and is extended as shown in Figure 1 and Table 3. The maximum length of this information element is 36 octets.

8	7	6	5	4	3	2	1	Octets
								1 to 16 see Q.2961.1 (Notes 1, 2)
Forward RM peak cell rate identifier								
1	1	0	0	0	0	0	0	17* (Notes 1, 3)
Forward RM peak cell rate								17.1* 17.2* 17.3*
Backward RM peak cell rate identifier								
1	1	0	0	0	0	0	1	18* (Notes 1, 3)
Backward RM peak cell rate								18.1* 18.2* 18.3*

NOTE 1 – All the parameters are position independent. "forward" indicates the direction from the calling user to the called user and "backward" refers to the direction from the called user to the calling user.

NOTE 2 – For ABT transfer capabilities, the forward/backward PCR (CLP = 0 + 1) and the forward/backward SCR (CLP = 0 + 1)/forward/backward MBS (CLP = 0 + 1) traffic parameters do not include the ABT RM cells.

NOTE 3 – Included when the broadband transfer capability indicates ABT-DT or ABT-IT in the Broadband bearer capability information element. Mandatory in both directions in a SETUP message. Optional in both directions in a CONNECT message.

Figure 1/Q.2961.4 – ATM traffic descriptor information element

Table 3/Q.2961.4 – ATM traffic descriptor information element

<p>– Forward/backward resource management peak cell rate (octets 17.1-17.3 and 18.1-18.3 respectively):</p> <p>The forward and backward RM PCR indicates the maximum cell rate requested for resource management. A value expressing in pure 3 octet integer representation the number of cells per second, with bit 8 of the first octet being the most significant bit, and bit 1 of the third octet being the least significant bit.</p> <p>NOTE 1 – For ABT, the CLP bit of the RM cells is always set to 0.</p> <p>NOTE 2 – For ABT, the forward/backward resource management peak cell rates are not included in the forward/backward peak cell rate [PCR (0 + 1)] values specified in the ATM traffic descriptor information element.</p>

Annex A identifies the valid combinations of traffic parameters in the ATM traffic descriptor information element for the ABT-DT and ABT-IT transfer capabilities. For ABT, the PCR (CLP = 0 + 1) parameters are mandatory in the ATM traffic descriptor information element and interpreted as indicating the maximum cell rate that can be used for the transfer of blocks of ATM cells over the connection during the lifetime of the call. The SCR and MBS parameters may also be included. By default, the sustainable cell rate is assumed to be equal to 0 and the maximum burst size is assumed to be equal to 1.

Annex A also summarizes the valid combinations of traffic-related parameters for ABT as well as the relationships with I.371 [3] defined ATM Transfer Capabilities (ATC) and with I.356 [11] defined Quality of Service (QOS) classes, as extensions, to Annex A/Q.2961.2 for ABT.

8.2.2 Broadband bearer capability

The Broadband bearer capability information element is specified in Recommendation Q.2961.2 [9] and is used to explicitly identify the ATM transfer capability as indicated below.

The following codepoints are added to the BTC field of the broadband Bearer capability information element to indicate ABT-DT or ABT-IT. Accordingly, the following is added to the part of Table 1/Q.2961.2 entitled "Values used on transmission and reception":

- *Broadband transfer capability (octet 5a)*

Bits

<u>7</u>	<u>6</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>1</u>	
0	0	1	0	0	0	0	0ABT-DT
0	0	1	0	0	0	1	ABT-IT

These values are to be used on transmission and reception of the Broadband bearer capability information element.

8.2.3 Minimum acceptable ATM traffic descriptor

The minimum acceptable ATM traffic descriptor information element is specified in Recommendation Q.2962 [10] and is extended as shown in Figure 2. The maximum length of this information element is 36 octets.

9 Signalling procedures at the coincident S_B and T_B reference point

The procedures for basic call/connection control as defined in clause 5/Q.2931 [2] as modified in clause 9/Q.2961.1 [8] (for the indication of the SCR and MBS traffic parameters) and in clause 9/Q.2962 [10] (for the negotiation of the PCR, SCR, MBR and RM peak cell rate, when actually used) shall apply. Only additional procedures to handle the point-to-point ABT call/connections are described in the following subclauses. These procedures shall apply only when the SETUP message contains a Broadband bearer capability information element indicating ABT-DT or ABT-IT in the broadband transfer capability field (see Recommendation Q.2961.2 [9]).

9.1 Connection establishment at the originating interface

The procedures in 5.1/Q.2931 apply, modified by the following additional procedures.

If the calling party is requesting an ABT-DT, respectively an ABT-IT, ATM transfer capability for the connection, the calling party shall send a SETUP message containing a Broadband bearer capability information element specifying "ABT-DT", respectively "ABT-IT", in the broadband transfer capability field and "point-to-point" in the user plane connection configuration field.

Additionally, the following rules apply:

- Tagging shall not be requested.
- The calling party shall include the forward and backward RM PCR parameters in the ATM traffic descriptor information element.
- The calling party may include the forward and/or backward SCR/MBS (CLP = 0 + 1) parameters in the ATM traffic descriptor information element.
- If the calling user wants to allow negotiation of a PCR (CLP = 0 + 1) parameter value, the corresponding PCR (CLP = 0 + 1) parameter is included in the minimum acceptable ATM traffic descriptor information element.
- If the calling user wants to allow negotiation of an SCR (CLP = 0 + 1) or MBS (CLP = 0 + 1) parameter value, the corresponding parameter is included in the minimum acceptable ATM traffic descriptor information element.
- If the calling user allows negotiation of a RM peak cell rate value, the corresponding peak cell rate (RM) parameter is included in the minimum acceptable ATM traffic descriptor information element.

8	7	6	5	4	3	2	1	Octets
								1 to 8 see Q.2962 (Note 1)
Forward sustainable cell rate identifier (CLP = 0 + 1)								
1	0	0	1	0	0	0	0	9* (Notes 1, 2)
Forward sustainable cell rate (for CLP = 0 + 1)								9.1*
Forward sustainable cell rate (for CLP = 0 + 1)								9.2*
Forward sustainable cell rate (for CLP = 0 + 1)								9.3*
Backward sustainable cell rate identifier (CLP = 0 + 1)								
1	0	0	1	0	0	0	1	10* (Notes 1, 2)
Backward sustainable cell rate (for CLP = 0 + 1)								10.1*
Backward sustainable cell rate (for CLP = 0 + 1)								10.2*
Backward sustainable cell rate (for CLP = 0 + 1)								10.3*
Forward maximum burst size identifier (CLP = 0 + 1)								
1	0	1	1	0	0	0	0	11* (Notes 1, 2)
Forward maximum burst size identifier (CLP = 0 + 1)								11.1*
Forward maximum burst size identifier (CLP = 0 + 1)								11.2*
Forward maximum burst size identifier (CLP = 0 + 1)								11.3*
Backward maximum burst size identifier (CLP = 0 + 1)								
1	0	1	1	0	0	0	1	12* (Notes 1, 2)
Backward maximum burst size (for CLP = 0 + 1)								12.1*
Backward maximum burst size (for CLP = 0 + 1)								12.2*
Backward maximum burst size (for CLP = 0 + 1)								12.3*
Forward RM peak cell rate identifier								
1	1	0	0	0	0	0	0	13* (Notes 1, 2)
Forward RM peak cell rate								13.1*
Forward RM peak cell rate								13.2*
Forward RM peak cell rate								13.3*
Backward RM peak cell rate identifier								
1	1	0	0	0	0	0	1	14* (Notes 1, 2)
Backward RM peak cell rate								14.1*
Backward RM peak cell rate								14.2*
Backward RM peak cell rate								14.3*

NOTE 1 – All the parameters are position independent. "Forward" indicates the direction from the calling user to the called user and "backward" refers to the direction from the called user to the calling user.

NOTE 2 – May be included when the broadband transfer capability field indicates "ABT-DT" or "ABT-IT" in the broadband Bearer capability information element. When included, the corresponding traffic parameter value is negotiated at call/connection establishment time.

Figure 2/Q.2961.4 – Minimum acceptable ATM traffic descriptor information element

Table 4/Q.2961.4 – Minimum acceptable ATM traffic descriptor information element parameters

<ul style="list-style-type: none">– Forward/backward sustainable cell rate (CLP = 0 + 1) (octets 9.1-9.3 and 10.1-10.3 respectively): This field indicates the sustainable cell rate requested for each direction of the connection. A value expressing in pure 3 octet integer representation the number of cells per second, with bit 8 of the first octet being the most significant bit and bit 1 of the third octet being the least significant bit.– Forward/backward maximum burst size (CLP = 0 + 1) (octets 11.1-11.3 and 12.1-12.3 respectively): The forward and backward maximum burst size indicates the maximum burst size requested for each direction of the connection. A value expressing in pure 3 octet integer representation the number of cells, with bit 8 of the first octet being the significant bit and bit 1 of the third octet being the least significant bit.– Forward/backward resource management peak cell rate (octets 13.1-13.3 and 14.1-14.3 respectively): See Table 3.
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9.1.1 Traffic parameters selection procedures

When the ABT transfer capability is requested, the following additional procedures and rules apply:

- The ABT resource management cells are not included in the PCR (0 + 1) parameters.
- If PCR (0 + 1), SCR/MBS (0 + 1) and/or PCR (RM) traffic parameters are negotiated, the procedures defined in 9.1/Q.2962 shall apply for the selection of these traffic parameters.

9.2 Call/connection establishment at the destination interface

The procedures in 5.2/Q.2931 apply, modified by the following additional procedures.

9.2.1 Traffic parameter selection procedures

When the ABT transfer capability is requested, the following additional procedures and rules apply:

- The ABT resource management cells are not included in the Peak Cell Rate [PCR (0 + 1)] parameters.
- If PCR (0 + 1), SCR/MBS (0 + 1) and/or PCR (RM) traffic parameters are negotiated, the procedures defined in 9.2/Q.2962 shall apply for the selection of these traffic parameters.

9.3 Handling of specific error conditions

When the SETUP message is received with an ATM traffic descriptor information element which contains an invalid combination of traffic parameters (see 8.2.1) that is not applicable when an ABT transfer capability is requested, the ATM traffic descriptor information element shall be treated as a mandatory information element received with content error (see 5.6.7.2/Q.2931).

10 Signalling procedures at the T_B reference point for interworking with private B-ISDNs

The signalling procedures defined in clause 9 apply. No specific procedures are defined at the T_B reference point.

11 Interworking with other networks

11.1 Interaction with entities which do not support the ABT transfer capability

If an entity which does not support the capabilities described in this Recommendation receives a Broadband bearer capability information element identifying the ABT-IT or the ABT-DT ATM transfer capability in a SETUP message, it shall follow the procedures described in 5.6/Q.2931, 5.7/Q.2931 and 5.8/Q.2931 [2].

11.2 Interworking with N-ISDN

It is not possible to interwork the ABT-IT and the ABT-DT ATM transfer capability with an N-ISDN entity.

12 Interactions with supplementary services

The support of the ABT-IT and ABT-DT ATM transfer capabilities covered in this Recommendation have no impact on the support of CLIP, CLIR, COLP, COLR, DDI, SUB, UUS, MSN and CUG supplementary services as specified in Recommendations Q.2951 [5], Q.2955.1 [6] and Q.2957 [7].

13 Timers

See clause 7/Q.2931. No additional timers are defined.

14 Dynamic description (SDLs)

See Annex A/Q.2931. No additional SDLs are defined.

Annex A

Valid combinations of traffic-related parameters for the support of ABT transfer capabilities

This Annex summarizes the valid combinations of traffic-related parameters for the support of ABT transfer capabilities and identifies the relationships with I.371 [3] defined ATM transfer capabilities and with I.356 [11] defined QOS classes. It is intended to provide similar information to what is in Annex A/Q.2961.2 [9], for the support of ABT.

Table A.1/Q.2961.4 – Valid combinations of traffic-related parameters in the SETUP message

<i>Broadband bearer capability</i>				
Bearer class	A, C, X or FR			A, C, X or FR
Broadband transfer capability (binary value)	16			17
<i>Traffic descriptor for a given direction</i>				
PCR (CLP = 0)				
PCR (CLP = 0 + 1)	S			S
{SCR, MBS} (CLP = 0)				
{SCR, MBS} (CLP = 0 + 1)	O (Note 1)			O (Note 1)
PCR (RM)	S			S
Tagging	N			N
<i>OAM traffic descriptor</i>	O			O
End-to-end timing required (Note 2)	Y			N

Table A.1/Q.2961.4 – Valid combinations of traffic-related parameters in the SETUP message (end)

<i>For the given direction</i>				
Requested ATC	ABT-DT			ABT-IT
Implicitly requested QOS when the QOS class indicated is 0	Class 1			Class 2
<i>For the given direction</i>				
I.371 [3] ATC that supports the requested ATC	ABT-DT			ABT-IT
I.356 [11] defined QOS class that supports the implicitly requested QOS	Class 1			Class 2
<p>NOTE 1 – Optional. When not specified, SCR is equal to 0 and MBS is equal to 1.</p> <p>NOTE 2 – This information is not signalled.</p> <p>A blank in the Table means that the traffic parameter is not applicable for this combination.</p> <p>PCR = Peak Cell Rate, SCR = Sustainable Cell Rate, MBS = Maximum Burst Size, RM = Resource Management, S = Specified, O = Optional.</p>				

Appendix I

Guidelines for the setting of the instruction indicators

This Appendix provides guidelines for the setting of the instruction indicator field in the ATM traffic descriptor and the minimum acceptable ATM traffic descriptor information elements for the support of ABT. An implementation may choose to set the instruction indicator differently, depending on possible specific requirements.

Recommended setting of the instruction indicator for both information elements is as follows:

Flag: "ignore explicit instructions"

Action indicator: "not significant".

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